Effectiveness of betadine vs normal saline in catheter care for prevention of catheter associated urinary tract infection

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Abstract

Introduction: Healthcare associated infection (HAI) occurs worldwide and affects both developed and developing countries. Urinary tract infection is one of the common HAIs. These infections can result in sepsis, prolonged hospitalization, additional hospital costs and morbidity. **Methods:** A quasi-experimental study was conducted on 40 patients fulfilling the inclusion criteria or requiring daily catheter care and, are divided into two groups with indwelling catheter. Purposive sampling technique was used for selecting the sample. Data were collected from the subjects using observational checklist and pain scale. From the first day of catheterization, catheter care was given once daily with normal saline solution to one group and betadine solution to another group. The subjects were observed for the effectiveness of solutions used for the catheter care based on the infection criteria checklist until seven days. Altogether seven observations were done to assess the effectiveness of the solutions for each subject. **Results:** The findings revealed that in normal saline group 85% (17 patients) were found to be effective whereas, 15% (3 patients) were found to be not effective and, in the betadine group 100% (20 patients) were found to be effective. There was no significant difference in the effectiveness of normal saline and betadine in preventing CAUTI ($t_{(38)} = .27$ at 0.05 level of significance). **Conclusion:** Normal saline solution and betadine are both effective in prevention of catheter associated urinary tract infection. Nurses can give catheter care to the patients with indwelling catheter with the solutions.

Key words: Catheter Associated Urinary Tract Infection (CAUTI)), Normal Saline, Betadine, Indwelling catheter, Patients.

Introduction

Urinary tract infection is the most common nosocomial infection and accounts for 15% of nosocomial bacteraemia. More than five million patients every year are catheterized. If the patients are catheterized for more than seven days, up to 25 % developed Catheter Associated Urinary Tract Infection (CAUTI). CAUTI is the most common nosocomial infection comprising more than 40 % of all hospital-acquired infections (Warren, 1997). A study reported that urinary tract infection accounts for 32 % of all Healthcare–associated infections and is the most common nosocomial infection in intensive care units (Hooton, 2009). A study reported on "Catheter associated urinary tract infection: new aspects of novel urinary catheter" revealed that the underlying cause of catheter associated urinary tract infection is the formation of pathogenic biofilm on the surface of the indwelling urinary catheter and the used of antibiotic catheters provide control against UTI. It stated that the sole effective preventive strategy is the use of a closed drainage system and the removal of catheter as soon as possible (Ha & Cho, 2006). Nurses are responsible for

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the initiation of catheterization procedures for patients within the hospital or in the community setting. Through the clinical experience of the researcher, it was found that different solutions have been used for catheter care to prevent CAUTI. Principles of good practice, clinical guidance and expert opinion agree that urinary catheter must be taken care of using sterile equipment and aseptic technique. Hence, it is in the interest of the researcher to compare the effectiveness of using normal saline and betadine in urinary catheter care.

Objectives

1. To determine the effectiveness of using normal saline in urinary catheter care in preventing CAUTI.

2. To determine the effectiveness of using betadine in urinary catheter care in preventing CAUTI.

Materials and Methods

The research design and approach adopted for this study was quasi-experimental-evaluative research approach. The study was conducted among patients with indwelling urinary catheter at Down Town Hospital and International Hospital, Guwahati, Assam. The patients from the ICU, semi ICU, medical and surgical wards were included in the study. The sample size was 40 (20 in normal saline group and 20 in betadine group). Purposive sampling technique was used to select the sample. Patients above 18 years of age, catheterized on the first day of hospitalization, in situ for a minimum of seven days and those that require catheter care once daily were included in the study. Patients with existing urinary tract infections were excluded from the study.

Tools for data collection

The following instruments were used for data collection:

Tool 1: Demographic profile: age, gender, ward, diagnosis, Healthcare personnel introducing catheter, frequency of catheter care, and administration of antibiotics.

Tool 2: Observational checklist: It had three sections: *Section A*: consisted of twelve criteria to assess the steps of procedure for urinary catheter care. No scoring was given for the steps of procedure. *Section B* consisted of 2 specific criteria i.e., burning sensation and cloudy or bloody urine and six non-specific criteria i.e., redness, swelling, chills and shakes, fever >38°c or 100°f, pressure pain or discomfort at the lower back and stomach, strong urine odour to assess the signs of infection in catheter associated urinary tract infection. The scoring was: Yes -1 score and No - 0 score: Maximum score=8. If both the two specific criteria or any one of the specific and, two or more non-specific criteria were present than the laboratory test was to be done for urine culture and sensitivity. In case of any positive culture report, the name of the bacteria present had to be documented. *Section C*: Numerical rating pain scale (Universal Pain Assessment Tool) was used for assessing the pain. This tool was used only when there was presence of pain in the criteria checklist to assess the signs of infection.

To determine the content validity, the draft of the tool along with the criteria checklist was submitted to five experts and there was 80 to 100 % agreement on all items.

Reliability of the tool was established using inter-observer method and the reliability was found to be 0.99. Hence, the tool was found to be highly reliable.

Procedure for data collection

Prior to the data collection, ethical committee of Assam Down Town University, Panikhaiti, Assam, approved the study and permission was obtained from the Executive Director of Down Town Hospital and International Hospital, Guwahati, Assam. Data were collected from the patients after taking informed consent. From the first day of urinary catheterization, catheter care was given with normal saline and betadine once daily for both the groups of patients. Altogether, seven observations for assessing signs of urinary tract infections were done for each patient of both the groups for seven days through the observational checklist. Urine culture was sent for the patients with presence of two or more non-specific criteria. After confirmation of positive report, the name of the bacteria was documented in the checklist.

Results

Seven (35%) patients from normal saline group belonged to age group of >50 years and 10(50%) from betadine group belongs to age group of >50

years. In gender distribution both the groups had equal distribution of male and female patients of 10 (50%) each. Majority of the patients - eight (40%) from normal saline group and 15 (75%) from betadine group - were from ICU. Thirteen (65%) patients from the normal saline group of 13 were present with surgical diagnosis and seven (35%) patients were present with medical diagnosis. Majority of the patients from the betadine group with 13 (65%) had medical diagnosis and with seven (35%) had surgical diagnosis. Nurses introduced the catheter in both the groups - 13 (65%) from normal saline group and 12 (60%) patients from the betadine group. Seven (35%) patients from normal saline group and eight (40%) patients from betadine group were catheterized by the nursing assistant. Frequency of catheter care was given only once in normal saline group i.e., on 20 (100%) patients. In the betadine group, 18 (90%) patients got catheter care once and two (10%) patients got catheter care twice. Antibiotics were administered for majority of 18 (90%) of the patients from both normal saline and betadine group. Two (10%) patients in both normal saline and betadine group did not get any antibiotic.

Majority of the patients, 17 (85%) had no signs of infection and three (15%) showed signs of infection in normal saline group and, 20 (100%) patients showed no signs of infection in betadine group as indicated in Figure 1.
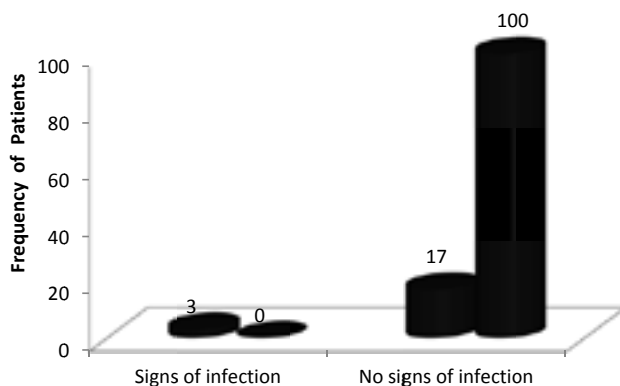

Figure 1. Cylindrical Bar Graph Showing Distribution as per Signs of Infection and No Signs of Infection

Independent *t*- test was computed to find out the effectiveness of normal saline and betadine solution in preventing CAUTI. The details are presented in Table 1.

Table 1:

Effectiveness of Normal Saline and Betadine Solution until Seventh Day.

Sl. No	Group Sample	n	Mean± SD	df	Independent "t" test
1.	Normal saline	20	49.85± 4.58	38	.27
2.	Betadine	20	50.15± 1.90		

*Not significant ($p < .05$)

Data presented in Table 1 indicates that the mean score of assessing the signs of infection in saline group was 49.85, which was less than the mean score of assessing the signs of infection in betadine group 50.15. The calculated independent t value ($t_{(38)}$ = .27) at .05 level of significance) was less than the table value ($t_{(38)}$ = 2.02) at .05 level of significance, inferring that there was no significant difference in the effectiveness of normal saline and betadine in preventing CAUTI.

Discussion

The study intended to assess the effectiveness of two different solutions in catheter care for prevention of CAUTI among the patients on indwelling catheter in a selected hospital. The findings of the present study support the findings of a study, which revealed that clean versus sterile techniques were effective in preventing catheter-associated bacteriuria, as the difference in both the groups was statistically insignificant. It was concluded that both the techniques are effective if carried out correctly (Dutta, Verma, & Mandal, 2012).

Conclusion

This study reported that normal saline and betadine were both effective in preventing CAUTI. It is the nurses' responsibility to give catheter care by maintaining aseptic technique so that, patients can be free from CAUTI.

Acknowledgements

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